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Article

The Effects of *Artemisia spicigera* Essential Oil before and after Flowering against Bovine Mastitis Bacteria

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Abstract: The absence of side effects of herbal essential oils and their antimicrobial effects has led researchers to evaluate the antimicrobial effects of essential oils and plant extracts in vitro to control microorganisms with a natural source. Artemisia is one of the genera of the *Anthemideae* family, widely distributed in the world and containing more than 400 species. In this study, *Artemisia spicigera* before and after flowering was prepared from region Bostanabad of East Azerbaijan and essential oils were extracted using Clevenger apparatus. Constituents of essential oil was analyzed by GC/MS. Then, the antimicrobial effect of essential oil *Artemisia spicigera* against bacteria isolated from clinical cases of bovine mastitis (*Staphylococcus aureus* and *Escherichia coli*) was determined and with

some standard antibiotics as a positive control was compared. For the preparation of bacteria of 20 cows with clinical mastitis was sampled and after culturing milk samples, the bacteria were isolated. The results showed that the inhibitoriest effect of Artemisia essential oils, before and after flowering, was 15 and 30 mm on *Staphylococcus aureus* and 9 and 25 mm on *Escherichia coli* in 100% concentration, respectively. Also in antibiogram method most diameter of inhibition zone in culture medium against *Staphylococcus aureus* and *Escherichia coli* was related to ceftriaxone, 40 and 25 mm, respectively. Results also showed that the antimicrobial effect of essential oils of *Artemisia spicigera* after flowering was more than before flowering. Due to the significant antibacterial activity of Artemisia essential oil in compared to different antibiotics can be concluded that essential oil of *Artemisia spicigera* has impressive antimicrobial properties, so it can be used in combination with other preservatives as natural herbal medicine using in treatment of mastitis in cows.

Keywords: *Artemisia spicigera*, Essential oil, mastitis, antimicrobials, *Staphylococcus aureus, Escherichia coli*

1. Introduction

The absence of side effects of herbal essential oils and their antimicrobial effects has led researchers to evaluate the antimicrobial effects of essential oils and plant extracts in vitro to control microorganisms with a natural source (Ihsan-ul-Haq et al., 2012). The excessive use of antibiotics can lead to a serious health outbreak in humans. The main goal of the World Health Organization is to minimize the use of antibiotics in livestock breeding livestock. Therefore, safe and natural alternative methods should be developed to control infections (Zafalon et al., 2007).

Artemisia is one of the genera of the *Anthemideae* family, widely distributed in the world and containing more than 400 species. In Iran, about 34 species have been reported to be used as a traditional medicinal plant (Ghavamizadeh et al., 2013, Mozaffarian, 1996). For this plant, there are various healing properties, including antimalarial, antiparasitic, antibacterial, anti-diabetes, astringent, anti-fever, anticancer, anti-hepatitis, anti-inflammatory, anti-spasm, antiviral and anti-headache (Masoudi et al., 2012, El-Massry et al., 2002). Bovine mastitis is defined as inflammation of the mammary glands that can cause infectious and non-infectious causes, as a result of inflammation of the breast glands, changes in milk, including the decrease in the synthesis of casein-lactose and the quality of milk fat occurs. (Blowey and Edmondson, 2010).